

Orbigator Electronics Specification (v1.6)

This version (v1.6) updates the Orbigator electronics specification with the finalized pin map, confirmed electrical behavior of CONFIRM and BACK buttons (active LOW), and revised UI input tables.

I²C Bus and User Interface

I²C0 Bus:

Signal	Function	Pico GPIO
I2C0_SDA	OLED + DS3231 RTC data	GP4
I2C0_SCL	OLED + DS3231 RTC clock	GP5

OLED + Rotary Encoder Board Inputs:

Module Pin	Signal	Function	Pico GPIO	Electrical
1	CONFIRM	OK / Select button	GP26	Active LOW (PULL_UP)
4	PSH	Encoder push button	GP18	Active LOW (PULL_UP)
5	TRA	Encoder A phase	GP16	Digital input
6	TRB	Encoder B phase	GP17	Digital input
7	BACK	Back / Cancel button	GP27	Active LOW (PULL_UP)

ULN2003 Stepper Drivers (28BYJ-48 Motors)

ULN2003 #1 – AOV Stepper:

Net	Function	Pico GPIO
AOV_IN1	ULN2003 #1 coil 1	GP8
AOV_IN2	ULN2003 #1 coil 2	GP9
AOV_IN3	ULN2003 #1 coil 3	GP10
AOV_IN4	ULN2003 #1 coil 4	GP11

ULN2003 #2 – Spare Stepper:

Net	Function	Pico GPIO
ULN2_IN1	ULN2003 #2 coil 1	GP19
ULN2_IN2	ULN2003 #2 coil 2	GP20
ULN2_IN3	ULN2003 #2 coil 3	GP21
ULN2_IN4	ULN2003 #2 coil 4	GP22

Pololu-Style STEP/DIR Drivers (Bipolar Steppers)

Pololu #1 – LAN Stepper:

Net	Function	Pico GPIO
LAN_STEP	Pololu #1 STEP	GP14
LAN_DIR	Pololu #1 DIR	GP15
LAN_M0	Microstep M0	GP2
LAN_M1	Microstep M1	GP3
POLOLU_EN	Shared EN/SLEEP	GP13

Pololu #2 – Spare Bipolar Stepper:

Net	Function	Pico GPIO
M2_STEP	Pololu #2 STEP	GP0
M2_DIR	Pololu #2 DIR	GP1
M2_M0	Microstep M0	GP6
M2_M1	Microstep M1	GP7
POLOLU_EN	Shared EN/SLEEP	GP13

High-Level Block Diagram (Table Style)

Pico Pin	Signal Name	Peripheral
GP4	SDA	OLED + RTC (I ² C bus)
GP5	SCL	OLED + RTC (I ² C bus)
GP16	ENC_A	Rotary Encoder A
GP17	ENC_B	Rotary Encoder B
GP18	ENC_PUSH	Encoder Switch
GP26	CONFIRM	Confirm Button
GP27	BACK	Back/Cancel Button
GP8–11	AOV_IN1–4	ULN2003 #1 (AOV stepper)
GP19–22	ULN2_IN1–4	ULN2003 #2 (Spare stepper)
GP14	LAN_STEP	Pololu #1 STEP
GP15	LAN_DIR	Pololu #1 DIR
GP2, GP3	LAN_M0, LAN_M1	Pololu #1 microstep pins
GP0, GP1	M2_STEP, M2_DIR	Pololu #2 STEP/DIR
GP6, GP7	M2_M0, M2_M1	Pololu #2 microstep pins
GP13	POLOLU_EN	Shared EN/SLEEP for all Pololu drivers

Notes

- CONFIRM and BACK buttons verified via multimeter to be active LOW (short to ground when pressed).
- Use internal pull-up resistors for all active-LOW buttons (CONFIRM, BACK, PSH).
- OLED and DS3231 share the I²C0 bus on GP4/GP5.
- ULN2003 #1 drives the AOV motor; ULN2003 #2 is available for expansion.
- Pololu #1 drives the LAN stepper; Pololu #2 is available for future expansion.
- EN/SLEEP line is shared across both Pololu drivers.